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REMARKSStatus of Claims

Claims 1-25, 27-41, and 43-46 are currently pending. Claim 38 stands rejected under 35 U.S.C. §112 and 35 U.S.C. §102(b). Claims 1-25, 27-37, 39-41, and 43-46 are allowed.

Claim 38 has been amended. Basis for the amendment to claim 38 is found in FIGURES 4A and 4B and on page 9, lines 6-11, of the specification as filed. Claims 1-25, 27-41, and 43-46 remain upon entering the present amendment. No new matter has been added.

Claim Rejections – 35 U.S.C. §112

Claim 38 has been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitation of “said contact area at said low-load condition is located at a substantially different position from said contact area at said higher load condition” has been deleted thus rendering any rejection thereto moot. Furthermore, the amendments here presented are made for the purposes of better defining the invention, rather than to overcome the rejections for patentability. No presumption should therefore attach that the claims have been narrowed over those earlier presented, or that subject matter or equivalents thereof to which the Applicants are entitled has been surrendered. Moreover, no presumption should therefore attach that the amendment here presented requires further consideration because of a change of scope. The amendment merely makes explicit which was implicit and reiterates what the Examiner points out with respect to the 112 rejection, second paragraph. More specifically, the Examiner states in the Final Office action mailed on November 11, 2002, that “[m]ore clearly, the high-load contact area encompasses the low-load contact area, and therefore the contact areas are not located in substantially different positions.”

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Claim Rejections – 35 U.S.C. §102(b)

Claim 38 has been rejected under 35 U.S.C. §102(b) as being anticipated by Visser (U.S. Patent No. 3,122,938) (hereinafter "Visser"). For an invention to be anticipated under 35 USC §102, the reference must teach each and every aspect of the claimed invention either expressly or impliedly. Moreover, the single source must disclose all of the claimed elements "arranged as in the claim." (Emphasis added.) *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 716, 223 U.S.P.Q. 1264, 1271 (Fed. Cir. 1984). Applicants respectfully submit that claim 38, as amended, is not anticipated by Visser under 35 U.S.C. §102(b) because aspects of Applicants' claim 38 are not taught by Visser either explicitly or implicitly.

Visser teaches a gear having a web 14 disposed on a hub 12, a rim 10 disposed on web 14, and rigid teeth 16 disposed on rim 10. "Web 14 is a flexible diaphragm of relatively thin material which is adapted to be flexed to cause the gear teeth 16 to mesh with a helical gear." (Column 2, lines 22-25). The teeth of the Visser invention are *rigid* (column 2, lines 15, 30, and 52-53) (emphasis added). Furthermore, "[w]hen it is stated...that the web...is flexible while the hub, rim and teeth are rigid,...what is meant is that [the deformation of] the hub, rim, and teeth ... is **insignificant** compared to the deformation of the web." (Column 2, lines 29-33). Moreover, Visser teaches that "it is *essential* that the **deformation** of rim 10, teeth 16 and hub 12 be **insignificant** compared to the deformation of web 14." (Emphasis added.) (Column 2, lines 41-43). Thus, Visser teaches away from deformation of the teeth to increase contact area therebetween, because any increase in load causes deformation of the flexible web and not the rigid teeth.

Visser further teaches a gear meshing in which "the teeth of gear 102 are wedged by an interference fit into the worm 100." (Column 3, lines 61-63). The interference fit is effected by the spring loading of the elastic web. (Column 1, lines 40-41). Spring loading of the web causes it to "oilcan to keep the axis of shaft 110 normal to the axis of worm 100." (Column 3, lines 69-70).

Visser fails to teach a worm/worm gear assembly being engaged in double flank contact such that a first contact area between a tooth of said worm and a tooth of said worm gear is smaller in size at a low load condition than a second contact area is at a

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higher load condition, *and such that* said first contact area at said low-load condition increases to form said second contact area at said higher load, as is claimed in Applicants' amended claim 38. Thus, imposing various loads on the worm/worm gear assembly accordingly alters the size of the contact area (i.e., between teeth) while maintaining double flank contact. In contrast, because the teeth of both the worm and worm gear of the Visser invention are *rigid* and all flexibility of the Visser gear originates from the web, variation of the size of the contact areas at varying load conditions (during operation of the Visser invention) is precluded.

In fact, if the contact areas of Visser were to change at all, the only feasible change would be relegated to defeating double flank contact or the interference fit that Visser strives for with reference to Figures 10, 12, and 15 and Col. 1, lines 38-42. Thus Visser teaches away from such a change in contact area between the worm/worm gear assembly.

More specifically with specific reference to Figure 15 of Visser, since the helix angles between worm 100 and gear 102 are different and the rectangular profile of the teeth of gear 102 are wedged by an interference fit into contiguous teeth of worm 100 to provide "double flank contact", the oil canning of web 106 provides the means necessary to provide this double flank contact while maintaining the axis of shaft 110 normal to the axis of worm 100. Col. 3, lines 67-71 and Figures 13-15. This oil canning is most clearly depicted in Figure 9 of Visser resulting in meshing engagement of rectangular teeth contact skewed such that diametrically opposite edge portions provide contact with contiguous teeth of a corresponding gear or worm. (See Figures 10, 12, and 15 for this skewed orientation of rectangular teeth meshingly engaged with contiguous teeth of a corresponding gear or worm).

Visser does not teach or suggest that a contact area between a worm and worm gear being engaged in double flank contact in a low-load condition is smaller than a contact area therebetween at a higher load condition as alleged by the Examiner in the Detailed Action. Moreover, Visser teaches away from deformable teeth that would provide variable contact areas as "such devices do not achieve the desired accuracy" of precision shaft rotation. See Col. 1, lines 25-29. One skilled in the art will readily recognize that Visser teaches a rectangular profiled gear tooth that is skewed to contact

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contiguous teeth of a corresponding gear to reduce backlash by loading web 106 to oilcan to provide a skewed arrangement while maintaining relative shaft alignment therebetween unchanged as best seen with reference to Figures 10, 12 and 15 in Visser. The flexibility of web 106 in Visser merely provides a means to spring load an interference fit between the teeth of a helical gear and a worm or between the teeth of a spur gear and a worm. The spring loaded interference fit between the rectangular teeth of worm gear and contiguous teeth of the worm maintain different helix angles between the worm and the rectangular teeth of the worm gear while maintaining respective shaft alignments normal to each other to provide double flank contact. Visser teaches rigid teeth on both the worm and worm gear and in fact teaches away from configuring teeth on either the worm or worm gear having "individually deformable teeth such as those in Patent No. 2,764,034 for 'Antibacklash Gear System' to W. Hotine, . . . [as], such devices do not achieve the desired accuracy . . . . The fact that there are a large number of different kinds of so-called anti-backlash gears on the market is a monument to the fact that the problem has not been, heretofore, adequately solved." Col. 1, lines 23-32.

Therefore, Applicants assert that the worm/worm gear assembly of their claim 38 is patentably distinct from the invention of Visser. Consequently, because Visser does not teach what Applicants claim, viz., a worm/worm gear assembly in which the contact area between a tooth of the worm and a tooth of the worm gear is smaller at a low load condition and larger at a high load condition while being engaged in double flank contact, and such that a first contact area at the low-load condition increases to form a larger second contact area at the higher load condition while being engaged in double flank contact, Applicants' claim 38 is not anticipated by Visser. Applicants' claim 38 is therefore believed to be allowable, and Applicants respectfully request that the rejection of claim 38 based on Visser be withdrawn.

#### Conclusion

In view of the foregoing points that distinguish Applicants' invention from those of the prior art and render Applicants' invention not obvious, Applicants respectfully request that the Examiner reconsider the present application, remove the rejections, and allow the application to issue.


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If the Examiner believes that a telephone conference with Applicants' attorneys would be advantageous to the disposition of this case, the Examiner is invited to telephone the undersigned.

If additional charges are incurred with respect to this Amendment, they may be charged to Deposit Account Number 06-1130 maintained by Applicants' attorneys.

Respectfully submitted,

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**Marked up version to show changes made:**CLAIM 38. (amended twice) A worm/worm gear assembly, comprising:

a worm; and

a worm gear, said worm gear being engaged in double flank contact with said worm such that a first contact area between a tooth of said worm and a tooth of said worm gear is smaller in size at a low load condition than ~~said~~ a second contact area is at a higher load condition, and such that said first contact area at said low-load condition increases to form ~~is located at a substantially different position from said~~ second contact area at said higher load condition.